PB-246 627

SANTEETLAH LAKE, GRAHAM COUNTY, NORTH CAROLINA

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center

June 1975

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TECHNICAL REPORT DATA (Please read Instructions on the reverse before completing)		
1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO. PB 246 627
4. TITLE AND SUBTITLE Report on Santeetlah Lake, Graham County, North Carolina		5. REPORT DATE Prepared June 1975
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Anonymous (National Eutrophication Survey Staff)		8. PERFORMING ORGANIZATION REPORT NO. Working Paper # 389
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Eutrophication Survey U.S. Environmental Protection Agency 200 S. W. 35th St. Corvallis, Oregon 97330		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS Office of Research and Development U.S. Environmental Protection Agency 401 M Street, S. W. Washington, DC 20460		13. TYPE OF REPORT AND PERIOD COVERED Final - 1973
		14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading		05B 05C

PRICES SUBJECT TO CHANGE

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Release unlimited		52
	20. SECURITY CLASS (This page)	22. PRICE $4.50

EPA Form 2220-1 (9-73)

325045

REPORT
ON
SANTEETLAH LAKE
GRAHAM COUNTY
NORTH CAROLINA
EPA REGION IV
WORKING PAPER No. 389

WITH THE COOPERATION OF THE
NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
AND THE
NORTH CAROLINA NATIONAL GUARD

JUNE, 1975

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F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the North Carolina Department of Natural and Economic Resources for professional involvement and to the North Carolina National Guard for conducting the tributary sampling phase of the Survey.

Lewis R. Martin, Director of the Division of Environmental Management; Darwin L. Coburn, Chief of the Water Quality Section; and Julian R. Taylor, Supervisor of the Monitoring Program Unit; provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

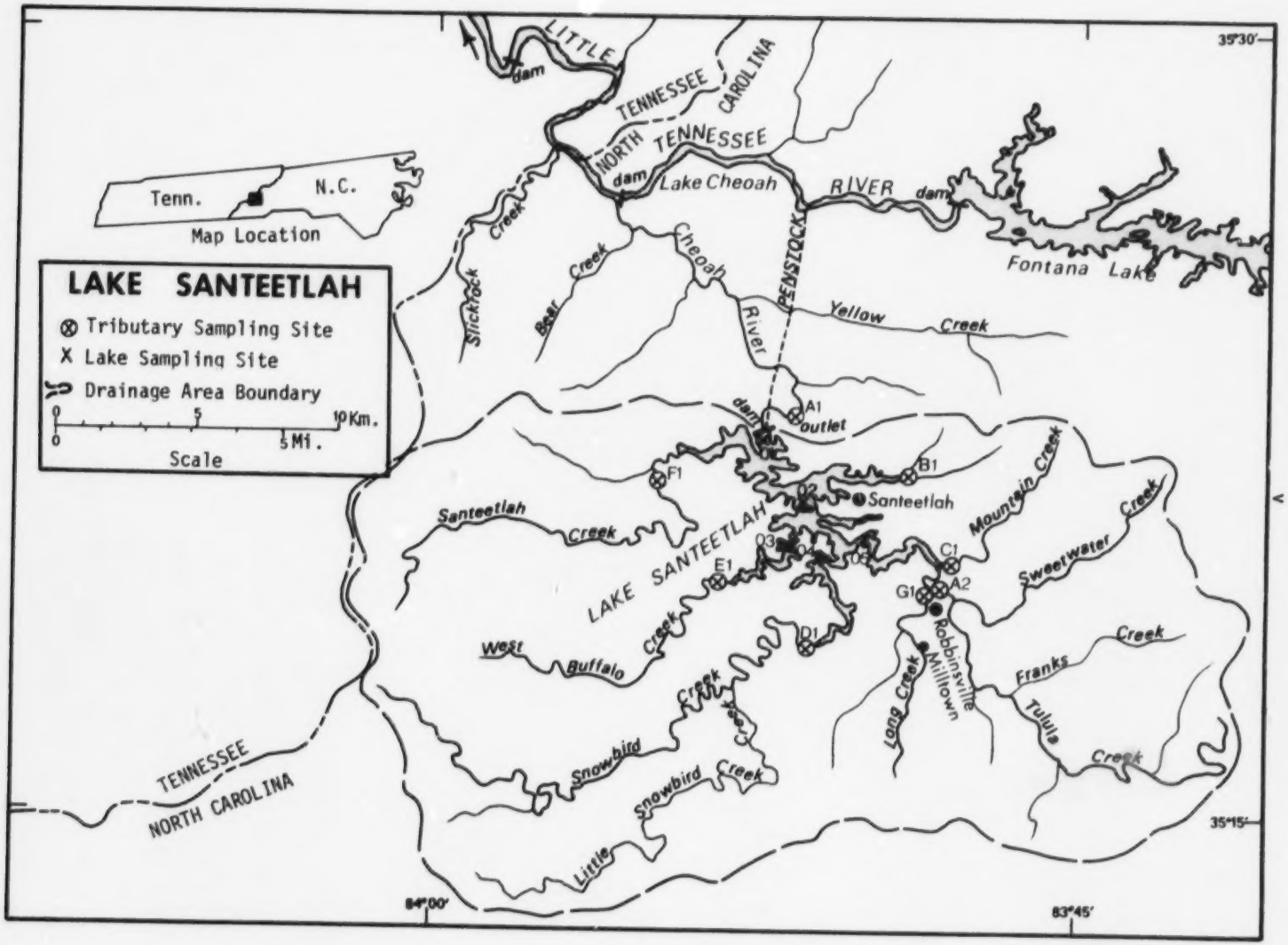
Major General William M. Buck, formerly Adjutant General of North Carolina, and Project Officer Colonel Arthur J. Bouchard, who directed the volunteer efforts of the North Carolina National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF NORTH CAROLINA

LAKE NAME	COUNTY
Badin	Montgomery, Stanly
Blewett Falls	Anson, Richmond
Chatuge	Clay, NC; Towns, GA
Fontana	Graham, Swain
Hickory	Alexander, Caldwell, Catawba
High Rock	Davidson, Rowan
Hiwassee	Cherokee
James	Burke, McDowell
John H. Kerr (Nut Bush Creek)	Granville, Vance, Warren, NC; Halifax, Mecklenburg, VA
Junaluska	Haywood
Lookout Shoals	Alexander, Catawba, Iredell
Mountain Island	Gaston, Mecklenburg
Norman	Catawba, Iredell, Lincoln, Mecklenburg
Rhodhiss	Burke, Caldwell
Santeetlah	Graham
Tillery	Montgomery, Stanly
Waccamaw	Columbus
Waterville	Haywood
Wylie	Gaston, Mecklenburg, NC; York, SC


LAKE SANTEETLAH
Tributary Sampling Site
Lake Sampling Site
Drainage Area Boundary
0 5 10 Km.
0 5 Mi.
Scale
Tenn.
N.C.
Map Location
LITTLE TENNESSEE
dam
NORTH CAROLINA
TENNESSEE
NORTH TENNESSEE
dam
Lake Cheoah
RIVER
dam
Fontana Lake
Stecoah Creek
Bear Creek
Cheoah River
PENSTOCK
Yellow Creek
dam
A1
outlet
F1
B1
Santeetlah
Santeetlah Creek
LAKE SANTEETLAH
Mountain Creek
Sweetwater Creek
C1
A2
G1
E1
D1
West Buffalo Creek
Robbinsville
Millstown
Long Creek
Franks Creek
Tulula Creek
Snowbird Creek
Little Snowbird Creek
TENNESSEE
NORTH CAROLINA
35°30'
35°15'
84°00'
83°45'

SANTEETLAH LAKE

STORET NO. 3716

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Santeetlah Lake is mesotrophic. It ranked second in overall trophic quality when the 16 North Carolina lakes sampled in 1973 were compared using a combination of six parameters*. Fourteen of the lakes had greater and one had the same median total phosphorus, 11 had greater and one had the same median dissolved phosphorus, 13 had greater and one had the same median inorganic nitrogen, nine had greater mean chlorophyll a, and none of the lakes had greater Secchi disc transparency. Depression of dissolved oxygen with depth occurred at station 2 in August and October and at stations 3 and 5 in August.

Survey limnologists noted some submerged aquatic vegetation in the shallow areas near station 1 in August.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Santeetlah Lake was phosphorus limited at the time the sample was collected (06/03/73). The lake data obtained in June and August further indicate limitation by phosphorus; i.e., the mean N/P ratios were 50/1 and

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* See Appendix A.

38/1, respectively. However, the results of the October sampling indicate a borderline nitrogen limitation (the mean N/P ratio was 13/1).

C. Nutrient Controllability:

1. Point sources--During the sampling year, the mean contribution from point sources was 15.7% of the total phosphorus load reaching Santeetlah Lake. The entire point-source load was contributed by the town of Robinsonville.

The present loading rate of 0.68 $g/m^2/yr$ is substantially less than the rate proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 14). Maintainence of the present low phosphorus loading rate should ensure continuance of the existing trophic condition of Santeetlah Lake.

2. Non-point sources--The mean annual phosphorus load from non-point sources represented 84.3% of the total impacting Santeetlah Lake. The Cheoah River contributed 32.3%; Snowbird Creek, 21.0%; Mountain Creek, 6.1%; Santeetlah Creek, 5.3%; and the three remaining tributaries collectively contributed 13.4%. The phosphorus load from ungaged tributaries was estimated to be 3.5% of the total.

The phosphorus export rates of the Santeetlah Lake tributaries (see page 14) are comparable to the rates of tributaries

to nearby Fontana Lake* (mean = 28 kg/km^2/yr; range of 11 to 46 kg/km^2/yr) and Hiwassee Lake** (mean = 19 kg/km^2/yr; range of 10 to 37 kg/km^2/yr); and it appears likely that such export rates are typical for western North Carolina streams.

* Working Paper No. 379.
** Working Paper No. 382.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 11.59 kilometers^2.
2. Mean depth: 16.8 meters.
3. Maximum depth: 65 meters.
4. Volume: 195 x 10^6 m^3.
5. Mean hydraulic retention time: 161 days (based on outlet flow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)	Mean flow (m^3/sec)*
Cheoah River	143.2	4.1
Ollie Branch, Buffalo Creek	9.5	0.3
Mountain Creek	19.6	0.6
Snowbird Creek	109.0	4.5
West Buffalo Creek	35.7	1.2
Santeetlah Creek	76.7	2.0
Long Creek	30.6	1.0
Minor tributaries & immediate drainage -	19.9	0.8
Total	444.2	14.5

2. Outlet -

Cheoah River	455.8**	14.0

C. Precipitation***:

1. Year of sampling: 184.1 centimeters.
2. Mean annual: 142.6 centimeters.

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† Table of metric conversions--Appendix B.
†† Park, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Santeetlah Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from five stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the five stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 51.8 meters at station 1, 42.7 meters at station 2, 21.3 meters at station 3, 21.3 meters at station 4, and 21.6 meters at station 5.

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR SANTEETLAH LAKE
STORET CODE 3716

PARAMETER	1ST SAMPLING (6/ 3/73) 5 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/22/73) 5 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/26/73) 5 SITES RANGE	MEAN	MEDIAN
TEMP (C)	7.0 - 23.2	16.5	16.2	7.1 - 27.3	19.8	21.0	6.2 - 19.6	17.9	19.5
DISS OXY (MG/L)	4.9 - 10.6	8.2	7.9	0.2 - 8.4	4.7	4.7	0.4 - 8.0	5.6	6.8
CNDCTVY (MCROMO)	50. - 50.	50.	50.	50. - 115.	57.	50.	9. - 40.	17.	17.
PH (STAND UNITS)	6.1 - 7.5	6.7	6.6	5.7 - 8.4	6.4	6.1	6.3 - 7.7	6.7	6.6
TOT ALK (MG/L)	10. - 12.	10.	10.	10. - 20.	10.	10.	10. - 10.	10.	10.
TOT P (MG/L)	0.009 - 0.034	0.017	0.014	0.005 - 0.018	0.010	0.009	0.007 - 0.038	0.012	0.011
ORTHO P (MG/L)	0.002 - 0.009	0.004	0.004	0.002 - 0.013	0.006	0.005	0.009 - 0.016	0.011	0.011
NO2+NO3 (MG/L)	0.050 - 0.230	0.114	0.100	0.060 - 0.370	0.133	0.090	0.020 - 0.310	0.054	0.030
AMMONIA (MG/L)	0.040 - 0.230	0.086	0.080	0.040 - 0.540	0.098	0.070	0.010 - 0.590	0.085	0.040
KJEL N (MG/L)	0.200 - 0.800	0.256	0.200	0.200 - 0.800	0.359	0.300	0.200 - 0.700	0.237	0.200
INORG N (MG/L)	0.100 - 0.430	0.199	0.175	0.110 - 0.690	0.230	0.160	0.050 - 0.630	0.139	0.080
TOTAL N (MG/L)	0.260 - 0.900	0.369	0.320	0.260 - 0.910	0.492	0.490	0.220 - 0.740	0.291	0.240
CHLRPYL A (UG/L)	2.3 - 9.3	4.9	3.9	4.7 - 7.8	5.9	5.6	4.1 - 6.2	5.3	5.1
SECCHI (METERS)	3.0 - 5.5	4.3	4.6	2.6 - 3.4	3.0	3.0	2.4 - 3.7	2.9	2.7

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
06/03/73	1. Flagellates	348
	2. Gymnodinium	307
	3. Tabellaria	287
	4. Mallomonas	184
	5. Green coccoid cells	143
	Other genera	247
	Total	1,516
08/22/73	1. Asterionella	460
	2. Tabellaria	412
	3. Anabaena	63
	4. Synedra	48
	5. Blue-green filaments	48
	Other genera	112
	Total	1,143
10/26/73	1. Asterionella	1,587
	2. Tabellaria	205
	3. Flagellates	187
	4. Gymnodinium	56
	5. Cryptomonas	56
	Other genera	280
	Total	2,371

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
06/03/73	01	3.9
	02	9.3
	03	3.3
	04	2.3
	05	5.8
08/22/73	01	7.8
	02	6.6
	03	5.6
	04	4.8
	05	4.7
10/26/73	01	4.1
	02	6.2
	03	5.0
	04	5.1
	05	5.9

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	<0.004	0.104	0.1
0.050 P	0.054	0.104	2.0
0.050 P + 1.0 N	0.054	1.104	13.5
1.0 N	<0.004	1.104	0.1

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Santeetlah Lake was low at the time the sample was collected (06/03/73). The addition of only phosphorus produced

an increased yield over that of the control, indicating phosphorus limitation. Note that addition of only nitrogen resulted in a yield not significantly greater than the control.

The lake data obtained at sampling times further substantiate limitation by phosphorus. Note that the mean N/P ratios were 50/1 and 38/1 in June and August, respectively. In October, the mean ratio was 13/1 which may indicate borderline nitrogen limitation at that time.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the North Carolina National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the North Carolina District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in kg/km^2/year, at stations C-1, D-1, E-1, and F-1 and multiplying the means by the ZZ area in km^2.

Nutrient loads in the untreated wastes of Robbinsville were estimated at 1.587 kg P and 4.263 kg N/capita/year.

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* See Working Paper No. 175.

A. Waste Sources:

1. Known muncipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Robbinsville	777	none	294.1**	Cheoah River

2. Known industrial - None

* Anonymous, 1971.
** Estimated at 0.3785 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Cheoah River	2,545	32.3
Ollie Branch, Buffalo Creek	360	4.6
Mountain Creek	480	6.1
Snowbird Creek	1,650	21.0
West Buffalo Creek	365	4.6
Santeetlah Creek	415	5.3
Long Creek	335	4.3
b. Minor tributaries & immediate drainage (non-point load) -	275	3.5
c. Known municipal STP's -		
Robbinsville	1,235	15.7
d. Septic tanks - Unknown	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	205	2.6
Total	7,865	100.0

2. Outputs -

Lake outlet - Cheoah River 5,315

3. Net annual P accumulation - 2,550 kg.

* See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Cheoah River	62,280	26.9
Ollie Branch, Buffalo Creek	6,550	2.8
Mountain Creek	9,145	3.9
Snowbird Creek	55,650	24.0
West Buffalo Creek	17,250	7.4
Santeetlah Creek	40,420	17.4
Long Creek	15,010	6.5
b. Minor tributaries & immediate drainage (non-point load) -	9,885	4.3
c. Known municipal STP's -		
Robbinsville	3,310	1.4
d. Septic tanks - Unknown	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	12,515	5.4
Total	232,015	100.0

2. Outputs -

Lake outlet - Cheoah River 184,830

3. Net annual N accumulation - 47,185 kg.

* See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Cheoah River	18	435
Ollie Branch, Buffalo Creek	38	689
Mountain Creek	24	467
Snowbird Creek	15	511
West Buffalo Creek	10	483
Santeetlah Creek	5	527
Long Creek	11	491

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	0.68	0.22	20.0	4.1

Vollenweider loading rates for phosphorus (g/m²/yr) based on mean depth and mean hydraulic retention time of Santeetlah Lake:

"Dangerous" (eutrophic rate)	1.18
"Permissible" (oligotrophic rate)	0.59

V. LITERATURE REVIEWED

Anonymous, 1971. Inventory of municipal waste facilities. EPA Publ. OWP-1, vol. 4, Washington, DC.

Park, David, 1975. Personal communication (lake morphometry). NC Dept. of Nat. & Econ. Resources, Raleigh.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	3719	LAKE WACCAMAW	534
2	3716	SANTEELAH LAKE	446
3	3711	MOUNTAIN ISLAND LAKE	419
4	3707	HIWASSEE LAKE	414
5	3704	FONTANA LAKE	392
6	3713	LAKE NORMAN	346
7	3708	LAKE JAMES	334
8	3710	LOOKOUT SHOALS	327
9	3715	RHODHISS LAKE	296
10	3705	LAKE HICKORY	283
11	3717	LAKE TILLERY	246
12	3709	LAKE JUNALUSKA	220
13	3702	BLEWETT FALLS LAKE	200
14	3718	WATERVILLE RESERVOIR	140
15	3701	BADIN LAKE	124
16	3706	HIGH ROCK LAKE	76

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
3701	BADIN LAKE	33 (5)	7 (1)	27 (4)	27 (4)	3 (0)	27 (4)	124
3702	BLEWETT FALLS LAKE	7 (1)	13 (2)	7 (1)	73 (11)	93 (14)	7 (1)	200
3704	FONTANA LAKE	100 (15)	33 (5)	93 (14)	100 (15)	3 (0)	63 (9)	392
3705	LAKE HICKORY	27 (4)	60 (9)	53 (8)	13 (2)	80 (12)	50 (7)	283
3706	HIGH ROCK LAKE	13 (2)	20 (3)	0 (0)	0 (0)	23 (2)	20 (3)	76
3707	HIWASSEE LAKE	87 (13)	80 (12)	87 (13)	47 (7)	50 (7)	63 (9)	414
3708	LAKE JAMES	60 (9)	87 (13)	80 (12)	7 (1)	23 (2)	77 (11)	334
3709	LAKE JUNALUSKA	47 (7)	27 (4)	43 (6)	20 (3)	50 (7)	33 (5)	220
3710	LOOKOUT SHOALS	53 (8)	47 (7)	60 (9)	67 (10)	60 (9)	40 (6)	327
3711	MOUNTAIN ISLAND LAKE	73 (11)	73 (11)	43 (6)	53 (8)	87 (13)	90 (13)	419
3713	LAKE NORMAN	67 (10)	53 (8)	73 (11)	40 (6)	23 (2)	90 (13)	346
3715	RHODHISS LAKE	20 (3)	67 (10)	33 (5)	93 (14)	70 (10)	13 (2)	296
3716	SANTEELAH LAKE	93 (14)	93 (14)	100 (15)	60 (9)	23 (2)	77 (11)	446
3717	LAKE TILLERY	40 (6)	40 (6)	13 (2)	33 (5)	70 (10)	50 (7)	246
3718	WATERVILLE RESERVOIR	0 (0)	0 (0)	20 (3)	80 (12)	40 (6)	0 (0)	140
3719	LAKE WACCAMAW	80 (12)	100 (15)	67 (10)	87 (13)	100 (15)	100 (15)	534

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
3701	BADIN LAKE	0.042	0.680	466.750	7.190	14.900	0.012
3702	BLEWETT FALLS LAKE	0.090	0.655	476.889	4.167	10.800	0.034
3704	FONTANA LAKE	0.011	0.550	392.650	3.438	14.900	0.007
3705	LAKE HICKORY	0.047	0.320	461.000	7.275	13.400	0.008
3706	HIGH ROCK LAKE	0.090	0.580	477.454	14.283	14.800	0.017
3707	HIWASSEE LAKE	0.015	0.240	420.555	5.678	14.200	0.007
3708	LAKE JAMES	0.020	0.160	428.866	7.660	14.800	0.006
3709	LAKE JUNALUSKA	0.031	0.560	462.000	7.233	14.200	0.009
3710	LOOKOUT SHOALS	0.026	0.370	459.167	4.200	13.800	0.008
3711	MOUNTAIN ISLAND LAKE	0.018	0.270	462.000	5.580	12.800	0.005
3713	LAKE NORMAN	0.019	0.330	446.667	5.807	14.800	0.005
3715	RHODHISS LAKE	0.061	0.305	462.111	3.578	13.600	0.019
3716	SANTEELAH LAKE	0.011	0.160	366.400	5.360	14.800	0.006
3717	LAKE TILLERY	0.040	0.470	468.600	6.827	13.600	0.008
3718	WATERVILLE RESERVOIR	0.103	0.860	468.333	3.817	14.400	0.041
3719	LAKE WACCAMAW	0.018	0.120	455.667	3.583	9.800	0.004

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 1/10/75

LAKE CODE 3716 SANTEETLAH LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 455.8

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3716A1	455.8	14.75	17.58	18.09	20.27	16.96	14.89	13.37	11.10	9.60	9.97	10.56	11.16	14.00
3716A2	143.2	6.65	6.94	7.50	5.38	4.53	3.26	2.78	2.27	1.70	1.84	2.27	4.67	4.14
3716B1	4.5	0.51	0.54	0.57	0.40	0.31	0.24	0.22	0.16	0.12	0.13	0.18	0.34	0.31
3716C1	19.6	1.08	1.10	1.13	0.85	0.65	0.48	0.45	0.31	0.25	0.25	0.37	0.71	0.63
3716D1	109.0	7.65	7.79	7.93	6.09	4.39	3.40	3.26	2.27	1.93	1.87	2.83	4.81	4.50
3716E1	35.7	1.90	1.95	2.07	1.56	1.19	0.91	0.79	0.59	0.48	0.48	0.68	1.25	1.15
3716F1	76.7	3.00	3.40	3.26	2.69	2.12	1.56	1.50	1.22	0.96	0.88	1.33	2.38	2.02
3716G1	30.6	1.56	1.93	1.90	1.59	1.05	0.76	0.71	0.57	0.40	0.37	0.59	1.19	1.05
3716Z2	31.6	1.13	1.33	1.30	1.08	0.76	0.57	0.54	0.40	0.31	0.28	0.45	0.85	0.75

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 455.8
SUM OF SUB-DRAINAGE AREAS = 455.9

TOTAL FLOW IN = 175.09
TOTAL FLOW OUT = 168.32

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3716A1	3	73	30.02	24	24.35				
	4	73	25.20	24	17.47				
	5	73	26.76	26	24.47				
	6	73	20.95						
	7	73	12.46	1	0.0	29	0.0		
	8	73	13.59						
	9	73	12.18	1	11.72	29	15.86		
	10	73	12.74						
	11	73	6.23	3	8.44				
	12	73	13.59	8	11.78				
	1	74	40.78	4	68.81	19	41.63		
	2	74	32.85	8	56.63	23	40.78		
3716A2	3	73	10.48	24	7.36				
	4	73	7.93	28	17.56				
	5	73	8.35	26	5.38				
	6	73	5.66						
	7	73	3.82	1	4.25	29	3.11		
	8	73	3.26						
	9	73	1.98	1	1.84	29	1.70		
	10	73	1.42						
	11	73	3.40	3	1.44				
	12	73	6.94	8	4.11				
	1	74	13.88	4	33.98	19	4.25		
	2	74	10.76	8	17.56	23	12.18		

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 1/10/75

LAKE CODE 3716 SANTEETLAH LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3716B1	3	73	0.57	3	0.40				
	4	73	0.45	28	0.57				
	5	73	0.48	26	0.42				
	6	73	0.34						
	7	73	0.21	1	0.31	29	0.18		
	8	73	0.20						
	9	73	0.11	1	0.10	29	0.09		
	10	73	0.09						
	11	73	0.20	3	0.08				
	12	73	0.40	8	0.24				
	1	74	0.71	4	2.27	19	0.48		
	2	74	0.57	9	0.85	23	0.71		
3716C1	3	73	1.42	24	0.85				
	4	73	0.99	28	2.12				
	5	73	1.08	26	0.62				
	6	73	0.71						
	7	73	0.45	1	0.48	29	0.37		
	8	73	0.40						
	9	73	0.24	1	0.21	29	0.18		
	10	73	0.17						
	11	73	0.42	10	0.17				
	12	73	0.79	8	0.48				
	1	74	1.56	4	4.53	19	0.99		
	2	74	1.27	8	2.41	23	1.42		
3716D1	3	73	9.06	24	7.36				
	4	73	7.79	28	17.84				
	5	73	8.07	26	5.38				
	6	73	5.38						
	7	73	3.82	1	4.39	29	3.26		
	8	73	2.97						
	9	73	1.42	1	1.98	28	1.67		
	10	73	1.27						
	11	73	3.68	3	1.50				
	12	73	7.08	7	4.96				
	1	74	13.45	4	26.90	19	8.50		
	2	74	10.34	9	15.57	23	12.46		
3716E1	3	73	2.27	24	1.56				
	4	73	1.70	28	2.69				
	5	73	1.78	26	1.13				
	6	73	1.19						
	7	73	0.79	1	0.91	29	0.68		
	8	73	0.71						
	9	73	0.42	1	0.40	28	0.34		
	10	73	0.31						
	11	73	0.59	3	0.31				
	12	73	1.47	7	1.02				
	1	74	2.97	4	5.38	19	1.84		
	2	74	2.27	9	3.43	23	2.69		

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 1/10/75

LAKE CODE 3716 SANTEETLAH LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3716F1	3	73	5.10	24	3.40				
	4	73	3.68	28	7.08				
	5	73	4.11	26	2.83				
	6	73	2.83	1	2.12	29	1.70		
	7	73	1.98						
	8	73	1.76						
	9	73	1.19	1	1.08	28	0.93		
	10	73	0.91						
	11	73	1.70	3	0.85				
	12	73	3.40	8	2.12				
	1	74	6.23	4	18.41	19	3.82		
	2	74	4.81	9	7.36	23	5.66		
3716G1	3	73	2.55						
	4	73	2.12						
	5	73	2.21						
	6	73	1.42						
	7	73	0.96	1	1.08	29	0.79		
	8	73	0.79						
	9	73	0.51	1	0.45	28	0.40		
	10	73	0.37						
	11	73	0.85	3	0.37				
	12	73	1.81	8	1.08				
	1	74	2.41	4	7.08	19	1.56		
	2	74	1.98	8	3.68	23	2.27		
3716ZZ	3	73	1.84						
	4	73	1.50						
	5	73	1.59						
	6	73	0.99						
	7	73	0.71						
	8	73	0.62						
	9	73	0.37						
	10	73	0.28						
	11	73	0.71						
	12	73	1.30						
	1	74	2.55						
	2	74	2.12						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/01/07

371601
35 22 33.0 083 52 34.0
SANTEELAH LAKE
37075 NORTH CAROLINA

11EPALES
3

2111202
0175 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	10 00	0000	22.4		216	50K	6.60	10	0.090	0.200	0.080	0.005
	10 00	0005	22.2	8.6		50K	6.80	10K	0.070	0.200K	0.070	0.003
	10 00	0015	18.0	10.6		50K	6.90	10K	0.070	0.200K	0.070	0.005
	10 00	0027	16.2	8.4		50K	6.50	11	0.080	0.200K	0.130	0.003
	10 00	0050	14.1	7.8		50K	6.40	10	0.090	0.200K	0.150	0.004
	10 00	0100	9.6	7.4		50K	6.30	11	0.110	0.200K	0.180	0.004
	10 00	0150	7.3	7.9		50K	6.10	10K	0.100	0.200K	0.230	0.004
	10 00	0170	7.0	7.8		50K	6.60	10K	0.100	0.200K	0.210	0.003
73/08/22	09 15	0000	25.7		120	50K	7.80	10K	0.090	0.400	0.070	0.011
	09 15	0005	25.6	8.4		60	7.30	10K	0.070	0.200	0.060	0.007
	09 15	0025	22.3	6.8		60	6.10	10K	0.060	0.200K	0.090	0.007
	09 15	0040	21.0	4.6		60	6.10	10K	0.090	0.200K	0.110	0.005
	09 15	0060	19.0	4.8		55	6.00	10K	0.050	0.200K	0.070	0.007
	09 15	0080	16.7	4.0		70	6.20	10K	0.050	0.200K	0.110	0.006
	09 15	0100	12.8	2.4		55	5.80	10K	0.050	0.200K	0.280	0.006
	09 15	0120	8.2	5.2		60	6.00	10K	0.050	0.200K	0.280	0.007
	09 15	0150	7.2	6.4		60	6.00	10K	0.060	0.300	0.250	0.006
	09 15	0170	7.1	2.5		70	6.00	10K	0.130	0.300	0.280	0.007
73/10/26	09 30	0000	19.5		144	16	7.70	10K	0.060	0.200	0.070	0.012
	09 30	0010	19.5	6.0		15	7.50	10K	0.040	0.200K	0.050	0.011
	09 30	0025	19.5	6.2		10	7.30	10K	0.040	0.200K	0.050	0.011
	09 30	0050	19.5	6.8		10	7.20	10K	0.050	0.200K	0.060	0.011
	09 30	0080	17.9	0.8		15	6.70	10K	0.160	0.200K	0.040	0.016
	09 30	0100	8.6	2.4		9	6.30	10K	0.050	0.200K	0.310	0.009
	09 30	0145	6.2	4.2		10	6.30	10K	0.060	0.200K	0.270	0.011

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

371601
35 22 33.0 083 52 34.0
SANTEELAH LAKE
37075 NORTH CAROLINA

11EPALES 2111202
3 0175 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	
73/06/03	10 00	0000	0.014	3.9	
	10 00	0005	0.011		
	10 00	0015	0.012		
	10 00	0027	0.013		
	10 00	0050	0.009		
	10 00	0100	0.009		
	10 00	0150	0.009		
	10 00	0170	0.010		U
73/08/22	09 15	0000	0.014	7.8	N
	09 15	0005	0.012		
	09 15	0025	0.010		
	09 15	0040	0.007		
	09 15	0060	0.008		
	09 15	0080	0.006		
	09 15	0100	0.006		
	09 15	0120	0.006		
	09 15	0150	0.005		
	09 15	0170	0.008		
73/10/26	09 30	0000	0.012	4.1	
	09 30	0010	0.011		
	09 30	0025	0.009		
	09 30	0050	0.009		
	09 30	0080	0.015		
	09 30	0100	0.007		
	09 30	0145	0.010		

STORET RETRIEVAL DATE 75/01/07

371602
35 21 18.0 083 51 50.0
SANTEELAH LAKE
37075 NORTH CAROLINA

11EPALES
3

2111202
0110 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	11 00	0000	22.6		180	50K	6.70	10K	0.080	0.200	0.080	0.008
	11 00	0005	22.1	9.4		50K	6.60	10	0.080	0.200K	0.080	0.003
	11 00	0018	17.8	8.6		50K	6.60	11	0.080	0.200K	0.110	0.006
	11 00	0035	15.5	7.4		50K	6.40	12	0.080	0.200K	0.140	0.004
	11 00	0050	13.9	7.6		50K	6.30	10K	0.070	0.200K	0.130	0.005
	11 00	0075	11.7	7.6		50K	6.20	10K	0.090	0.200K	0.150	0.002
	11 00	0100	9.8	5.4		50K	6.10	10K	0.170	0.200K	0.150	0.003
73/08/22	10 20	0000	25.7		120	50K	8.40	10K	0.080	0.500	0.080	0.005
	10 20	0005	25.7	8.3		50K	7.40	10K	0.060	0.200	0.060	0.006
	10 20	0025	22.2	5.9		60	6.50	10K	0.060	0.300	0.080	0.002
	10 20	0040	20.9	4.8		55	6.20	10K	0.060	0.200K	0.100	0.003
	10 20	0060	18.7	4.4		50K	5.90	10K	0.080	0.500	0.080	0.005
	10 20	0080	16.6	3.6		55	5.80	10K	0.050	0.300	0.140	0.004
	10 20	0100	12.7	1.0		50K	5.80	10	0.160	0.300	0.320	0.003
	10 20	0120	8.5	2.0		50K	5.70	10K	0.080	0.400	0.370	0.008
	10 20	0140	7.5	2.8		60	6.00	10K	0.370	0.500	0.320	0.008
73/10/26	09 25	0000	19.6		108	16	6.50	10K	0.040	0.200K	0.040	0.010
	09 25	0005	19.6	6.2		17	6.60	10K	0.040	0.200K	0.040	0.011
	09 25	0030	19.6	6.8		15	6.50	10K	0.030	0.200K	0.030	0.009
	09 25	0065	19.2	5.6		13	6.50	10K	0.080	0.200K	0.030	0.010
	09 25	0090	14.2	0.4		40	6.60	10K	0.590	0.700	0.040	0.012
	09 25	0105	7.9	0.6		23	6.40	10K	0.420	0.400	0.030	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

29

STORET RETRIEVAL DATE 75/01/07

371602
35 21 18.0 083 51 50.0
SANTEELAH LAKE
37075 NORTH CAROLINA

11EPALES 2111202
3 0110 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/03	11 00	0000	0.016	9.3
	11 00	0005	0.013	
	11 00	0018	0.034	
	11 00	0035	0.018	
	11 00	0050	0.013	
	11 00	0075	0.010	
	11 00	0100	0.022	
73/08/22	10 20	0000	0.010	6.6
	10 20	0005	0.009	
	10 20	0025	0.006	
	10 20	0040	0.006	
	10 20	0060	0.008	
	10 20	0080	0.007	
	10 20	0100	0.006	
	10 20	0120	0.007	
	10 20	0140	0.006	
73/10/26	09 25	0000	0.009	6.2
	09 25	0005	0.010	
	09 25	0030	0.009	
	09 25	0065	0.011	
	09 25	0090	0.038	
	09 25	0105	0.011	

STORET RETRIEVAL DATE 75/01/07

371603
35 20 27.0 083 52 00.0
SANTEETLAH LAKE
37075 NORTH CAROLINA

11EPALES
3

2111202
0060 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	11 40	0000	22.6		180	50K	6.60	10K	0.060	0.200K	0.060	0.003
	11 40	0005	21.8	9.4		50K	6.60	10K	0.050	0.200K	0.060	0.003
	11 40	0015	18.5	10.2		50K	6.70	10K	0.070	0.200K	0.060	0.002
	11 40	0027	16.3	7.6		50K	6.50	10K	0.060	0.200K	0.070	0.003
	11 40	0035	15.5	7.8		50K	6.40	10K	0.080	0.200K	0.100	0.003
	11 40	0055	13.1	6.8		50K	6.30	10K	0.050	0.200K	0.080	0.004
73/08/22	11 00	0000	26.4		133	50K	6.90	10K	0.090	0.500	0.090	0.005
	11 00	0005	26.4	8.0		50K	6.90	10K	0.070	0.500	0.070	0.005
	11 00	0025	22.1	3.0		50K	6.00	10K	0.070	0.400	0.090	0.004
	11 00	0040	21.0	3.6		50K	5.70	10K	0.070	0.400	0.080	0.004
	11 00	0055	19.2	2.2		50K	5.80	10K	0.090	0.300	0.080	0.002
	11 00	0070	17.6	1.0		70	6.00	15	0.310	0.600	0.080	0.002
73/10/26	10 00	0000	19.4		120	16	6.60	10K	0.040	0.200	0.030	0.011
	10 00	0005	19.4	8.0		17	6.70	10K	0.040	0.200K	0.030	0.011
	10 00	0015	19.5	7.2		17	6.60	10K	0.040	0.200K	0.020	0.011
	10 00	0025	19.5	6.8		18	6.50	10K	0.030	0.200	0.020	0.011
	10 00	0040	19.4	7.2		16	6.60	10K	0.040	0.200	0.020	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

371603
35 20 27.0 083 52 00.0
SANTEETLAH LAKE
37075 NORTH CAROLINA

11EPALES 2111202
3 0060 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/03	11 40	0000	0.011	3.3
	11 40	0005	0.011	
	11 40	0015	0.014	
	11 40	0027	0.014	
	11 40	0035	0.024	
	11 40	0055	0.015	
73/08/22	11 00	0000	0.008	5.6
	11 00	0005	0.009	
	11 00	0025	0.008	
	11 00	0040	0.010	
	11 00	0055	0.006	
	11 00	0070	0.010	
73/10/26	10 00	0000	0.009	5.0
	10 00	0005	0.012	
	10 00	0015	0.010	
	10 00	0025	0.012	
	10 00	0040	0.010	

STORET RETRIEVAL DATE 75/01/07

371604
35 20 20.0 083 51 13.0
SANTEETLAH LAKE
37075 NORTH CAROLINA

11EPALES
3

2111202
0075 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	14 20	0000	23.2		144	50K	7.50	10K	0.080	0.400	0.070	0.006
	14 20	0005	22.6	9.8		50K	7.40	10K	0.070	0.200	0.080	0.002
	14 20	0015	18.6	9.4		50K	7.10	10K	0.080	0.200K	0.080	0.003
	14 20	0021	17.0	8.8		50K	7.00	10K	0.060	0.200K	0.080	0.004
	14 20	0035	15.5	8.4		50K	7.00	10K	0.060	0.200K	0.100	0.002K
	14 20	0050	13.9	7.8		50K	6.90	10K	0.040	0.200	0.080	0.003
	14 20	0070	12.1	4.9		50K	6.50	10K	0.170	0.300	0.100	0.004
73/08/22	11 25	0000	26.3		112	50K	7.40	10K	0.080	0.400	0.080	0.004
	11 25	0005	26.3	8.0		50K	7.00	10K	0.060	0.400	0.080	0.009
	11 25	0020	24.0	6.8		50K	6.20	10K	0.060	0.200K	0.060	0.003
	11 25	0035	21.4	6.4		50K	6.20	10K	0.040	0.200K	0.070	0.005
	11 25	0054	19.4	4.6		50K	5.90	10K	0.040	0.200K	0.070	0.007
73/10/26	10 40	0000	19.6		108	20	6.70	10K	0.050	0.400	0.050	0.010
	10 40	0010	19.5	6.8		20	6.60	10K	0.050	0.200K	0.030	0.012
	10 40	0025	19.5	6.8		18	6.70	10K	0.040	0.200K	0.020	0.013
	10 40	0050	19.3	7.2		19	6.60	10K	0.040	0.200K	0.020	0.011

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

371604
35 20 20.0 083 51 13.0
SANTEETLAH LAKE
37075 NORTH CAROLINA

11EPALES 2111202
3 0075 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/03	14 20	0000	0.016	2.3
	14 20	0005	0.017	
	14 20	0015	0.016	
	14 20	0021	0.013	
	14 20	0035	0.027	
	14 20	0050	0.019	
	14 20	0070	0.014	
73/08/22	11 25	0000	0.011	4.8
	11 25	0005	0.013	
	11 25	0020	0.010	
	11 25	0035	0.010	
	11 25	0054	0.012	
73/10/26	10 40	0000	0.012	5.1
	10 40	0010	0.012	
	10 40	0025	0.010	
	10 40	0050	0.011	

34

STORET RETRIEVAL DATE 75/01/07

371605
35 20 42.0 083 50 08.0
SANTEETLAH LAKE
37075 NORTH CAROLINA

11EPALES
3

2111202
0075 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	13 40	0000	22.0		120	50K	6.60	10K	0.120	0.800	0.100	0.006
	13 40	0006	21.4	9.8		50K	7.30	10K	0.050	0.500	0.050	0.005
	13 40	0015	18.1	9.2		50K	7.00	10K	0.080	0.400	0.160	0.006
	13 40	0030	14.9	8.4		50K	6.90	10K	0.080	0.300	0.200	0.007
	13 40	0050	12.9	7.6		50K	6.80	10K	0.060	0.400	0.170	0.009
	13 40	0071	11.0	6.2		50K	6.60	10K	0.230	0.400	0.200	0.009
73/08/22	16 00	0000	27.3		103	50K	8.30	10K	0.060	0.600	0.080	0.013
	16 00	0005	26.5	8.4		50K	7.10	10K	0.080	0.500	0.100	0.004
	16 00	0015	25.3	6.8		50K	6.80	10K	0.040	0.500	0.070	0.009
	16 00	0025	22.5	5.8		60	6.20	10K	0.060	0.500	0.140	0.009
	16 00	0040	20.5	5.8		60	6.00	10K	0.090	0.400	0.160	0.006
	16 00	0055	19.2	1.6		60	6.00	10K	0.060	0.300	0.250	0.002
	16 00	0068	17.9	0.2		115	6.30	20	0.540	0.800	0.110	0.004
73/10/26	10 20	0000	19.6		96	20	6.70	10K	0.080	0.300	0.030	0.011
	10 20	0005	19.5	7.6		20	6.70	10K	0.040	0.200	0.030	0.013
	10 20	0020	19.6	6.8		20	6.60	10K	0.040	0.200K	0.030	0.014
	10 20	0040	19.5	6.8		19	6.60	10K	0.040	0.200	0.020	0.013
	10 20	0057	19.4	7.4		20	6.60	10K	0.060	0.200K	0.050	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

371605
35 20 42.0 083 50 08.0
SANTEETLAH LAKE
37075 NORTH CAROLINA

11EPALES 2111202
3 0075 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/03	13 40	0000	0.022	5.8
	13 40	0006	0.018	
	13 40	0015	0.024	
	13 40	0030	0.028	
	13 40	0050	0.023	
	13 40	0071	0.025	
73/08/22	16 00	0000	0.014	4.7
	16 00	0005	0.016	
	16 00	0015	0.017	
	16 00	0025	0.013	
	16 00	0040	0.018	
	16 00	0055	0.015	
	16 00	0068	0.018	
73/10/26	10 20	0000	0.013	5.9
	10 20	0005	0.013	
	10 20	0020	0.013	
	10 20	0040	0.014	
	10 20	0057	0.018	

APPENDIX E

TRIBUTARY DATA

STORET RETRIEVAL DATE 75/01/13

3716A1 LS3716A1
35 23 00.0 083 52 00.0
CHEOAH RIVER
37023 7.5 FONTANA DAM
O/LAKE SANTEETLAH
RD 1134 BRDG 1.25 MI DOWNSTREAM OF DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	12 20		0.094	0.140	0.020	0.005K	0.010
73/04/24	10 30		0.096	0.225	0.032	0.005K	0.020
73/05/26	11 35		0.032	0.100K	0.016	0.010	0.010
73/07/01	12 00		0.050	0.460	0.020	0.007	0.010
73/07/29	11 00		0.030	0.210	0.035	0.005K	0.016
73/09/01	18 40		0.019	0.100K	0.013	0.009	0.010
73/09/29	14 00		0.147		0.035	0.020	
73/11/03	06 50		0.020	0.800	0.115	0.005K	
73/12/08	16 45		0.116	0.500	0.048	0.012	0.015
74/01/04	18 30		0.096	0.100K	0.040	0.005K	0.015
74/01/19	11 30		0.104	0.300	0.084	0.005K	0.010
74/02/08	16 30		0.108	0.700	0.075	0.005K	0.005
74/02/23	13 00		0.100	0.400	0.060	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

3716A2 LS3716A2
35 20 00.0 083 48 30.0
CHEOAH RIVER
37 7.5 ROBBINSVILLE
T/LAKE SANTEETLAH
CULVERT ON US 129 .5 MI NW ROBBINSVILLE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11	15	0.230	0.200	0.011	0.005K	0.025
73/04/28	11	11	0.168	0.210	0.030	0.006	0.035
73/05/26	12	45	0.120	0.190	0.017	0.010	0.050
73/07/01	12	30	0.154	0.360	0.015	0.006	0.025
73/07/29	11	40	0.154	0.540	0.023	0.005K	0.035
73/09/01	17	45	0.088	0.100K	0.038	0.005K	0.010
73/09/29	14	00	0.014		0.016	0.005K	
73/11/03	07	05	0.120	0.300	0.036	0.005K	
73/12/08	17	00	0.200	0.200	0.032	0.008	0.020
74/01/04	12	30	0.224	0.100K	0.008	0.006	0.025
74/01/19	13	30	0.232	0.100K	0.020	0.005K	0.025
74/02/08	14	00	0.224	0.700	0.050	0.005	0.035
74/02/23	13	00	0.168	0.800	0.020	0.005K	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/12/13

371631 LS3716P1
35 22 00.0 083 49 30.0
VILLE BRANCH AND BUFFALO CREEK
37 7.5 ROBBINSVILLE
T/LAKE SANTEETLAH
L OF F PINE RIDGE CAMP WALK200 FT N 1254
11-PALES 211204
0000 FEET DEPTH

DATE FROM TO	TIME DEPTH DAY FEET	NITRO-GEN, AMMONIA TOTAL MG/L	NITRO-GEN, KJEL FINAL MG/L	NITRO-GEN, NO2+NO3 TOTAL MG/L	PHOS-PHATE, ORTHO MG/L P	PHOS-PHORUS PHOS-TOT MG/L P
73/03/03	11 55	0.147	0.350	0.110	0.007	0.030
73/04/20	10 15	0.042	1.200	0.180	0.004	0.060
73/05/24	11 20	0.010K	0.210	0.0055	0.007	0.025
73/07/01	12 10	0.014	0.390	0.011	0.0055	0.020
73/07/24	11 10	0.011	0.460	0.042	0.010	0.030
73/09/01	14 30	0.010K	0.240	0.014	0.0055	0.030
73/09/22	13 45	0.010K		0.026	0.006	
73/11/07	14 15	0.240	0.450	0.041	0.0055	
73/12/04	14 30	0.284	0.460	0.054	0.014	0.045
74/01/04	13 30	0.241	0.260	1.242	0.004	0.020
74/01/18	13 35	0.215	0.102K	0.020	0.0055	0.025
74/02/08	14 50	0.142	1.460	0.055	0.315	0.077
74/02/22	13 31	0.17	0.521	0.265	0.005	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 75/01/13

3716C1 LS3716C1
35 20 00.0 083 48 00.0
MOUNTAIN CREEK
37 7.5 ROBBINSVILLE
T/LAKE SANTEETLAH
RD 1256 BRDG .25 MI E OF US HWY 129
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11 25		0.160	0.220	0.038	0.005K	0.025
73/04/28	10 00		0.115	0.290	0.048	0.006	0.040
73/05/26	11 00		0.082	0.170	0.007	0.013	0.030
73/07/01	12 25		0.093	0.690	0.023	0.005K	0.020
73/07/29	11 30		0.105	0.415	0.052	0.014	0.030
73/09/01	19 00		0.080	0.730	0.054	0.005K	0.025
73/09/29	13 30		0.069		0.019	0.007	
73/11/10	08 30		0.076	0.150	0.018	0.015	0.015
73/12/08	16 00		0.144	0.100	0.028	0.008	0.010
74/01/04	17 45		0.250	0.200	0.012	0.005K	0.025
74/01/19	13 00		0.168	0.100K	0.016	0.005K	0.025
74/02/08	13 00		0.160	0.500	0.045	0.005K	0.020
74/02/23	15 00		0.124	0.300	0.015	0.005	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

371601 LS371601
35 18 30.0 083 51 30.0
SNOWBIRD CREEK
37 7.5 ROBBINSVILLE
T/LAKE SANTEETLAH
RD 1127 BRDG 3 MI W OF MILLTOWN BY RD
11EPALES 2111204
4 3000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11 30		0.045	0.130	0.005	0.005K	0.010
73/04/24	10 00		0.048	0.370	0.075	0.005K	0.020
73/05/24	12 30		0.012	0.100K	0.009	0.006	0.010
73/07/01	11 00		0.024	0.120	0.031	0.005K	0.010
73/07/29	12 35		0.023	0.200	0.078	0.022	0.025
73/09/01	17 10		0.010K	0.560	0.011	0.005K	0.010
73/09/24	13 15		0.010K		0.013	0.015	
73/11/03	12 00		0.015	0.400	0.120	0.005K	
74/01/04	17 15		0.064	0.100K	0.008	0.005K	0.010
74/01/19	10 30		0.042	0.100K	0.055	0.005K	0.010
74/02/09	17 15		0.056	1.400	0.103	0.005K	0.005
74/02/23			0.068	0.300	0.035	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

3716E1 LS3716E1
35 19 30.0 083 54 00.0
BUFFALO CREEK
37 7.5 SANTEETLAH C
T/LAKE SANTEETLAH
RD 1123 BRDG JUST E OF CEDAR BLUFF CHURC
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	12 00		0.060	0.180	0.027	0.005K	0.010
73/04/28	10 30		0.069	0.140	0.026	0.005K	0.015
73/05/26	12 15		0.025	0.100K	0.010	0.005K	0.010
73/07/01	11 15		0.056	0.660	0.025	0.005K	0.010
73/07/29	12 25		0.072	0.890	0.063	0.008	0.020
73/09/01	20 30		0.052	0.680	0.265	0.005K	0.010
73/09/28	18 30		0.012		0.022	0.005K	
73/11/03	12 15		0.010K	0.450	0.100	0.005K	
73/12/07	17 40		0.060	0.800	0.048	0.005K	0.010
74/01/04	17 45		0.104	0.400	0.016	0.005K	0.005
74/01/19	15 00		0.068	0.200	0.055	0.005K	0.010
74/02/09	17 30		0.080	0.300	0.040	0.005	0.005
74/02/23	13 00		0.068	0.100K	0.010	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

3716F1 LS3716F1
35 22 00.0 083 55 00.0
SANTEETLAH
37 7.5 SANTEETLAH C
T/LAKE SANTEETLAH
RD BRDG NE ENTRANCE JOYCE KILMER MEM FOR
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	12 30		0.189	0.150	0.031	0.005K	0.005K
73/04/28	11 00		0.200	0.280	0.036	0.005K	0.010
73/05/26	12 00		0.126	0.460	0.018	0.005K	0.010
73/07/01	11 35		0.110	0.200	0.012	0.005K	0.005K
73/07/29	12 10		0.110	1.200	0.048	0.005K	0.010
73/09/01	10 10		0.092	0.250	0.014	0.006	0.006
73/09/28	18 45		0.037		0.017	0.005K	
73/11/03	12 30		0.046	0.450	0.082	0.005K	
73/12/08	15 30		0.168	1.000	0.080	0.005K	0.005
74/01/04	18 00		0.192	0.700	0.028	0.005K	0.005
74/01/19	12 00		0.200	0.200	0.020	0.005K	0.005
74/02/09	18 15		0.192	0.300	0.025	0.005K	0.005K
74/02/23			0.208	0.400	0.020	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

371661
35 19 45.0 083 48 35.0
LONG CREEK
37 705 ROBBINSVILLE
T/LAKE SANTEETLAH
2NDRY RD BRDG .5 MI N OF ROBBINSVILLE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/01	10 40		0.078	0.100K	0.009	0.005K	0.005K
73/07/29	12 55		0.096	0.190	0.021	0.005K	0.010
73/09/01	17 30		0.150	0.210	0.018	0.008	0.035
73/09/28	18 00		0.073		0.020	0.011	
73/11/03	11 30		0.011	1.700	0.357	0.005K	
73/12/08	17 30		0.056	0.400	0.024	0.005K	0.010
74/01/04	12 50		0.064	0.100K	0.008	0.005K	0.005K
74/01/19	14 00		0.048	0.100K	0.008	0.005K	0.005K
74/02/08	07 30		0.060	0.500	0.035	0.005K	0.005K
74/02/23	14 30		0.068	0.100K	0.010	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED